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ABSTRACT

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Children's Noun-Pair Retention: Assessment of Pictorial Elaboration and Bizarreness Effects

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Note. The results of the first experiment were presented in a paper titled "Children's Noun-Pair Learning: Assessment of Pictorial Elaboration and Bizarreness Effects" at the biennial meeting of the Society for Research in Child Development, New Orleans, Louisiana, March 1977. The results of the second and third experiments were presented in a paper titled "Assessment of Pictorial Elaboration and Bizarreness Effects on the Acquisition and Long Term Memory of Noun Pairs" at the Western Psychological Association Meeting, San Francisco, California, April 1978.

Abstract

Three experiments were conducted to assess the effects of nonbizarre vs. bizarre pictorial elaboration on the paired-associate retention of noun pairs. Five and seven year old children served as subjects in the first two experiments and learned a list of common noun pairs by the study-test paired-associate method. Experiment 1 provided a between subjects analysis of bizarre elaboration effects, while Experiment 2 provided a within subjects analysis. The results of the two experiments indicated that both nonbizarre and bizarre pictorial elaboration faciliated performance relative to a standard presentation condition. A reliable difference between the two types of elaboration was not observed. Experiment 3 was designed to assess the effects of nonbizarre vs. bizarre pictorial elaboration on the seven day retention of noun pairs. The results of this final experiment indicated that the forgetting of pairs encoded under the different types of elaboration (nonbizarre vs. bizarre) was equivalent.

Children's Noun-Pair Retention: Assessment of Pictorial Elaboration and Bizarreness Effects

Pictorial elaboration in children's paired-associate learning consists of depicting the referents of the to-be-remembered (TBR) nouns in a spatial interaction (e.g., a picture of a chain coiled up inside a bowl). This type of presentation typically facilitates paired-associate performance relative to the standard presentation of the TBR referents side by side (Davidson & Adams, 1970; Kee & Rohwer, 1973; Reese, 1970). Research indicates that this facilitation occurs in the associative phase as opposed to the response phase of paired-associate learning (Kee & Rohwer, 1974). In addition, pictorial elaboration serves to enhance primarily the initial storage of the TBR pair members as opposed to their retrieval (Kee, 1976).

Theoretical accounts (e.g., Anderson & Bower, 1972; Paivio, 1971; Reese, 1977; Rohwer, 1973) suggest that pictorial elaboration facilitates paired-associate performance by prompting the encoding of a referential event for the otherwise disparate pair members. This event establishes a more cohesive memory trace for the TBR pairs, thereby increasing their availability relative to pairs encoded under standard presentation. Rohwer (1973) has proposed that this referential event be conceptualized as an episode which captures the shared meaning of the TBR pair members. Alternatively, Paivio (1971) has characterized this referential event in terms of an interactive image which couples the TBR pair members. Although the theoretical accounts may offer different characterizations of the specific nature of the coded event (e.g., shared meaning vs. interactive image), they do concur in suggesting that the quality of the referential event can be a significant factor affecting pair member availability.

One aspect of event quality may be the bizarreness of the pair relationship. For example, bizarre pictorial elaboration may prompt the encoding of the pair members in referential events that are more distinguishable in memory than nonbizarre pictorial elaboration. This might be expected because the members of each pair are more critical to the identity of a bizarre event (i.e., the event is more uniquely defined by the pair members), thereby reducing the vulnerability of the pair coupling to interference from other items relative to a nonbizarre event (cf. Lesgold & Goldman, 1972; Rohwer, 1973).

An examination of the stimuli used in previous pictorial elaboration studies with children (e.g., Davidson & Adams, 1970; Kee, 1976; Reese, 1970) indicates that TBR pair members in the learning list have been depicted under both nonbizarre (e.g., a picture of purse hanging on a hook; a picture of a candle on a table) and bizarre (e.g., a picture of a chicken carrying a flag; a picture of a fish smoking a pipe) elaboration. Thus, the facilitation observed in previous pictorial elaboration studies may have been due to nonbizarre elaboration, bizarre elaboration, or both. Two studies have attempted to provide an assessment of the influence of nonbizarre versus bizarre pictorial elaboration on paired-associate learning (cf. Senter & Hoffman, 1976; Wollen, Weber, & Lowery, 1972). The findings from these studies indicate that the two types of elaboration do not differentially affect paired-associate performance. An interpretation of these findings, however, is beclouded since these studies confounded individual referent bizarreness with elaborative bizarreness. Additionally, the implication of these findings for an understanding of elaborative facilitation in children is indeterminate because the studies were conducted with adult subjects. In this connection, research indicates that both older children and adults have a greater propensity than young children for the spontaneous elaboration of TBR pair members

(Kemler & Jusczuk, 1975; Kennedy & Suzuki, 1977; Rohwer & Bean, 1973; Rohwer, Raines, Eoff, & Wagner, 1977). This propensity of older subjects to spontaneously elaborate or recode pair members may serve to mask the influence of variation in pictorial elaboration (nonbizarre vs. bizarre). Thus, a more sensitive evaluation of potential bizarre pictorial elaboration effects can be obtained with young children who are less likely to recode the TBR pair members presented under elaboration (cf. Kee & Nakayama, Note 1).

The purpose of the present investigation was to determine if the nature of pictorial elaboration (i.e., nonbizarre vs. bizarre) affects children's paired-associate retention. The first experiment provides an assessment of the influence of both individual referent bizarreness and elaborative bizarreness of the pair relationship. Sampling was conducted at the five and seven year age levels. These age groups correspond to the target populations sampled in many of the previous pictorial elaboration studies (e.g., Rohwer, Kee, & Guy, 1975) and provide an opportunity to assess whether or not the influence of either referent bizarreness or elaborative bizarreness varies as a function of development.

Experiment 1

Design and Subjects

The basic design of the experiment consisted of a 2 x 2 x 3 factorial. The factors in the design were grade level (kindergarten vs. second), individual referent characterization (nonbizarre vs. bizarre), and presentation mode (standard vs. nonbizarre elaboration vs. bizarre elaboration). Planned comparisons were constructed to assess the expected pattern of referent characterization and presentation mode effects. The planned comparison for the factor of referent characterization consisted of a simple contrast between nonbizarre and bizarre referent characterization nested within each level of

presentation mode.

The specific contrasts for the factor of presentation mode were: (a) standard vs. nonbizarre elaboration; (b) standard vs. bizarre elaboration; (c) nonbizarre elaboration vs. bizarre elaboration. By applying this set of comparisons within each level of referent characterization, a direct estimate of presentation mode effects is provided for the type of paired-associate items (i.e., nonbizarre referents) which have been used in previous pictorial elaboration studies, and the generality of this pattern of effects can be evaluated with bizarre referents.

One hundred forty-four kindergarten (modal age = 5 years) and second (modal age = 7 years) grade children served as subjects. The children resided and attended school in a middle socioeconomic status white community neighboring Los Angeles, California. Census tract information from the 1970 U.S. Bureau of Census Report indicated that the children's community had a median educational level of 12.5 years and a median income in excess of $13,000. Equal numbers of children at each grade level were randomly assigned to one of the 12 experimental conditions.

Materials and Procedures

The materials for the study consisted of line drawings of 20 pairs of common objects (e.g., scissor-basket, shoe-boat, etc.). Nonbizarre referent characterization consisted of a conventional line drawing of each object in the list. This type of referent characterization is identical to that used in previous pictorial elaboration studies (e.g., Kee, 1976). Bizarre referent characterization consisted of an unusual or funny line drawing of each object in the list. Standard presentation of pairs consisted of the depiction of the TBR referents side by side. Nonbizarre elaboration consisted of the depiction of the referents engaged in an ordinary relationship (e.g., a picture

of a pair of scissors in a basket, a picture of a hammer resting on top of a stove, etc.), while bizarre elaboration consisted of the depiction of the referents engaged in a unique relationship (e.g., a picture of a pair of scissors standing on the handle of a basket, a picture of a hammer sticking out of the side of a stove, etc.). Examples of the different referent characterizations and modes of presentation are provided in Figure 1.

Insert Figure 1 about here

Three different adults participated as judges in the preparation of the pictorial stimuli in order to assure that the depiction of the individual referents and referent pairs conformed to the experimental criterion established for their nonbizarre and bizarre presentation. In addition, pretesting was conducted with the individual referents and indicated that both five and seven year old children could readily identify the referents under the nonbizarre and bizarre characterization.

The line drawings of the pairs for study trials and the stimulus cues for test trials were photographed onto 35-mm slide transparencies. Four random orders of the list were prepared: Two for use on study trials and two for use on test trials. All slide transparencies were presented to subjects on a side view projection screen by Kodak slide projector.

Subjects were tested individually by a female experimenter in a quiet room at the participating school. Each subject was seated at a table on which a side screen projection unit was located. The subject was informed that 20 pairs of object drawings would be presented and that (s)he was to learn them so as to be able to produce the name of one pair member when presented with the other. The 20 pair list was administered by the paired-associate

technique for two alternating cycles of study and test. The interval between study and test cycles was approximately 30 sec. A 4 sec per item (i.e., pair or stimulus cue) presentation rate was used on both study and test trials. As each pair or stimulus cue was presented visually, the experimenter labeled the referent(s) verbally.

Results and Discussion

The primary dependent variable selected for analysis was the total number of correct responses given on the two test trials. The Type I error rate for all tests was set at .025. Analysis of variance failed to detect any reliable source of variance associated with the factor of age ($F < 1$) or its interaction with the other factors (largest $F = 1.34$). Thus, the means presented in Table 1 as a function of referent characterization and presentation mode are collapsed over the factor of age.

Insert Table 1 about here

The simple contrast between nonbizarre and bizarre referent characterization nested within each level of presentation mode revealed that the two types of referent characterization did not differ ($F < 1$) within the standard presentation condition, while bizarre referent characterization impaired performance relative to nonbizarre referent characterization within both nonbizarre elaboration and bizarre elaboration conditions, $Fs(1,132) = 6.30$ and 5.30, respectively. This outcome indicates that the bizarre characterization of individual referents does not per se affect performance; however, when coupled with elaboration, it can impair performance relative to nonbizarre referent characterization.

The planned comparisons for the factor of presentation mode indicated

that within nonbizarre referent characterization, both nonbizarre elaboration and bizarre elaboration facilitated performance relative to standard presentation Fs(1,132) = 31.91 and 16.27, respectively. Furthermore, a reliable difference between the two types of elaboration was not detected, F(1,132) = 2.60. An identical pattern of presentation mode effects was also observed within bizarre referent characterization: (a) standard vs. nonbizarre elaboration, F(1,132) = 17.22; (b) standard vs. bizarre elaboration, F(1,132) = 7.53; and (c) nonbizarre elaboration vs. bizarre elaboration, F(1,132) = 1.98.[1]

Only four other significant effects were observed in this primary analysis. A trials effect indicated that performance improved between Trials 1 (M = 5.85) and 2 (M = 11.44), F(1,132) = 714.80. Interactions between the first presentation mode planned comparison (standard vs. nonbizarre elaboration) and trials indicated that the magnitude of facilitation associated with nonbizarre elaboration was larger on Trial 2 than on Trial 1 within both nonbizarre referent characterization, F(1,132) = 9.12, and bizarre referent characterization, F(1,132) = 21.77. The final significant effect was associated with an interaction between the second presentation mode planned comparison (standard vs. bizarre elaboration) and trials which indicated that a larger degree of elaborative facilitation was observed on Trial 2 than on Trial 1 within bizarre referent characterization F(1,132) = 11.38.

The data were analyzed for the occurrence of within-list and extralist intrusions. Within-list intrusions were defined as items from the list that were given as responses to an incorrect stimulus cue on the test trial, while extralist intrusions were words not on the list which were given as responses on the test trial. The rate of within-list intrusions was 1.81 of an item. The analysis indicated that second grade children (M = 2.15) made more within-list intrusions than kindergarten grade children (M = 1.48), F = (1,132) = 5.13,

MS_e = 6.23. A presentation mode comparison (standard vs. nonbizarre elaboration) indicated that more intrusions were associated with standard presentation than with nonbizarre elaboration for both nonbizarre referent characterization (standard--M = 2.50; nonbizarre elaboration--M = 1.60), $F(1,132)$ = 8.29, and bizarre referent characterization (standard--M = 2.77; nonbizarre elaboration--M = 1.27), $F(1,132)$ = 6.86, MS_e = 6.23. In addition, a second presentation mode planned comparison (standard vs. bizarre elaboration) indicated that a significant reduction of within-list intrusions was observed with bizarre elaboration (M = 1.19) relative to standard presentation (M = 2.50) under nonbizarre referent characterization. The last significant effect observed in the analysis of within-list intrusions was for trials and indicated that more intrusions were made on Trial 1 (M = 2.02) than on Trial 2 (M = 1.60), $F(1,132)$ = 7.16, MS_e = 1.74.

The rate of extralist intrusions was very low (M = .51). Analysis of variance revealed a trials effect which indicated that more extralist intrusions were associated with Trial 1 (M = .76) than Trial 2 (M = .26), $F(1,132)$ = 27.77, MS_e = .63. At a more lenient .05 alpha, only one other effect would have been statistically reliable. Kindergarten children (M = .64) would have been observed to have made more extralist intrusions than second grade children (M = .38), $F(1,132)$ = 4.40, MS_e = 1.08.

In summary, the primary purpose of Experiment 1 was to assess the influence of different types of pictorial elaboration (nonbizarre vs. bizarre) on children's paired-associate performance. The results clearly indicate that both types of elaboration can facilitate performance relative to standard pair presentation. In addition, the results indicate that the two types of elaboration do not differ in their relative effectiveness. These outcomes were observed for both the nonbizarre and bizarre characterization of individual

referents.

Experiment 2

Although a reliable difference was not detected between the two types of pictorial elaboration in the between subjects analysis offered in Experiment 1, an inspection of the means in Table 1 suggests a trend favoring nonbizarre elaboration over bizarre elaboration within both types of referent characterization. Thus, a second experiment was conducted to provide an additional and more sensitive assessment of possible differences between nonbizarre and bizarre pictorial elaboration. In this second experiment, the factor of presentation mode (standard vs. nonbizarre elaboration vs. bizarre elaboration) was manipulated within subjects. This type of mixed-list presentation of items is similar to the types of paired-associate lists used in previous studies which have nonsystematically included both nonbizarre and bizarre elaborative pairs (e.g., Davidson & Adams, 1970). In this connection, the subjects will have an opportunity to distinguish between the different types of elaborative pairs (nonbizarre vs. bizarre), thereby affording a very hospitable condition for the potential differences between the two types of elaboration to emerge in paired-associate learning.

In Experiment 2, the characterization of the individual referents within the pairs was not varied because the principal concern of the study was to examine the influence of different types of elaboration (nonbizarre vs. bizarre) on children's paired-associate retention. Thus, in this second experiment, all of the individual referents were depicted under the nonbizarre characterization. This type of characterization for the individual referents is identical to that used in a majority of the previous pictorial elaboration studies with children (e.g., Kee, 1976).

Design and Subjects

The design of the experiment consisted of a 2 x 3 factorial with grade level (kindergarten vs. second) as a between subjects factor and presentation mode (standard vs. nonbizarre elaboration vs. bizarre elaboration) as a within subjects factor. The set of planned comparisons constructed for the assessment of presentation mode effects in the first experiment was also applied in this experiment.

Twenty-four kindergarten (mean age = 5.63, range = 5.17 to 6.17) and 24 second (mean age = 7.48, range = 7.0 to 8.0) grade children served as subjects. The children were drawn from the same elementary school which provided subjects for Experiment 1.

Materials and Procedures

An 18 pair list of common object drawings was assembled. This list was comprised of 10 pairs from the first experiment which were judged to offer the most distinctive nonbizarre and bizarre elaborative depictions of each pair. Eight additional pairs were constructed in a manner similar to that described for the first experiment. The characterization of each referent within the pair was nonbizarre. Slide transparencies of these line drawings were prepared for use in the experiment.

It will be recalled that adult judges determined if the elaborations of each pair corresponded to the nonbizarre and bizarre classifications established for the study. In order to determine if children would also classify the stimuli in the same way, 12 kindergarten and 12 second graders were consulted. A high degree of consistency was found between the adult classification of the stimuli and that of the children (81% agreement at the kindergarten grade level and 93% agreement at the second grade level).

The basic 18 pair list constructed for this experiment was modified to

permit the within subject assessment of presentation mode. Thus, the 18 pairs were randomly divided into three equal sets of six. Each set represented one of the different presentation modes in the list. To provide an unequivocal assessment of the effects of presentation mode apart from the effects of item difficulty, items were counterbalanced across presentation modes. This was accomplished by systematically assigning each set of pairs to the different presentation modes, resulting in three versions of the paired-associate list. Pairs within each list were presented in a random order with the constraint that no more than two pairs from the same presentation mode could appear in sequence.

The procedures for the administration of the paired-associate task were identical to those described for the first experiment.

Results and Discussion

Table 2 presents the mean number of correct responses for the experimental

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Insert Table 2 about here

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conditions collapsed over the two test trials. The Type I error rate was set at .025 for all tests.

An analysis of variance was performed, and it revealed that the grade effect was not significant, $F(1,42) = 3.81$, $MS_e = 32.46$. The planned comparisons for the factor of presentation mode indicated that both nonbizarre and bizarre pictorial elaboration facilitated performance relative to standard presentation, $F(1,42) = 93.56$, $MS_e = 4.94$; $F(1,42) = 32.78$, $MS_e = 7.27$, respectively. Furthermore, nonbizarre elaboration was associated with a higher level of performance than bizarre elaboration $F(1,42) = 8.31$, $MS_e = 4.42$.

An interaction between the second planned comparison (i.e., standard vs.

bizarre elaboration) and list was detected, $F(1,42) = 9.77$, $MS_e = 7.27$. This interaction indicated that bizarre elaboration did not differ from standard presentation on one of the three versions of the paired-associate list used to counterbalance item type by presentation mode. Interactions between the third planned comparison (i.e., nonbizarre elaboration vs. bizarre elaboration) with the factors of grade and list were also detected: Grade x Comparison, $F(1,42) = 5.45$; List x Comparison, $F(1,42) = 18.24$; and Grade x List x Comparison, $F(1,42) = 6.56$, $MS_e = 4.42$. Descriptively, these interactions indicate that the superiority of nonbizarre elaboration to bizarre elaboration is restricted to one of the three versions of the paired-associate list used to counterbalance item type by presentation mode. The difference between the two conditions on this one list was larger at the kindergarten grade level than at the second grade level.

A significant trials effect was observed which indicated that performance improved between the first and second test trials, $F(1,42) = 219.57$, $MS_e = 5.79$. An Age x Trials interaction revealed that this gain was larger for the second grade children than the kindergarten grade children, $F(1,42) = 5.47$, $MS_e = 5.79$. An interaction between the third presentation mode planned comparison (i.e., nonbizarre elaboration vs. bizarre elaboration) and the factor of trials was also observed, $F(1,42) = 8.31$, $MS_e = 4.42$, indicating that the gain from Trial 1 to Trial 2 was larger for nonbizarre than bizarre elaboration. Higher order interactions involving the factors of grade and list indicate that this finding was not systematically observed within the different Grade x List combinations: Grade x Trial x Comparison, $F(1,42) = 5.44$; List x Trial x Comparison, $F(1,42) = 18.24$; and Grade x List x Trial x Comparison, $F(1,42) = 6.56$, $MS_e = 4.42$.

The data were also analyzed for the occurrence of within-list and extralist

intrusions. Both the rate of within-list (M = .74) and extralist intrusions (M = .35) were extremely low. Analysis of variance revealed only one significant effect for each type of intrusion. Nonbizarre elaboration (M = .20) was associated with a lower rate of within-list intrusions than standard presentation (M = .88), $F(1,42) = 7.41$, $MS_e = 1.13$. A grade effect was observed for extralist intrusions; kindergarten grade children (M = .42) made more extralist intrusions than did the second grade children (M = .28), $F(1,42) = 21.72$, $MS_e = 1.02$.

The second experiment was conducted to provide a more sensitive test of potential bizarre elaboration effects than that offered in the between subjects analysis of Experiment 1. The results indicate that bizarre elaboration can impair performance relative to nonbizarre elaboration. This finding, however, was quite limited in that it was observed on only one of the three versions of the paired-associate list used to counterbalance list items by presentation mode. Thus, the preponderance of evidence from this within subjects analysis indicates that the nature of elaboration (nonbizarre vs. bizarre) does not consistently influence children's paired-associate performance.

Experiment 3

The results from the first two experiments clearly indicate that both nonbizarre and bizarre pictorial elaboration facilitate paired-associate performance relative to standard presentation. However, contrary to expectation, an advantage was not associated with bizarre pictorial elaboration relative to nonbizarre pictorial elaboration. In the foregoing experiments, the retention interval between study and test did not exceed 30 sec. Recent studies suggest that an immediate test of this variety can mask the effects associated with variation in the nature of elaboration. For example, Hasher, Griffin, and Johnson (1977) report that while no difference is observed

between stimulus related elaborators and response related elaborators on an immediate test, substantial differences are observed after one week. Similarly, Wolff, Levin, and Longobardi (1974) report no difference between performers (i.e., subjects who act out an interaction with the TBR toy objects) and observers (i.e., subjects who simply observe the interaction between the TBR toy objects) on an immediate test, but a substantial difference in favor of the performers on a 24 hour delayed test. Thus, a third experiment was conducted to assess the possibility that while TBR pair members encoded under nonbizarre and bizarre elaboration are equally available for short retention intervals, pairs encoded under bizarre elaboration will offer more resistance to inter-pair interference over an extended retention interval, thereby producing less forgetting relative to pairs encoded under nonbizarre elaboration.

Design and Subjects

Presentation mode was manipulated within subjects and consisted of a comparison between nonbizarre elaboration and bizarre elaboration. Subjects participated in two sessions: Immediate test and long-term retention. Based on the outcome of Experiment 2, it was anticipated that performance on the immediate test would be equivalent in the elaboration conditions. Thus, any differences observed at the one-week retention test could be attributed to differential forgetting and not differential degrees of original learning (cf. Underwood, 1964).

The previous experiments indicated that presentation mode effects are similar for both the kindergarten and second grade children. Therefore, in this experiment sampling was only conducted with the second grade population. A total of 20 children participated in the study (mean age = 8.04, range = 7.53 to 8.50). These children attended the same elementary school which provided subjects for the previous experiments.

Materials and Procedures

The materials consisted of 35-mm slide transparencies of 12 pairs of object drawings selected from the pool of 18 pairs used in Experiment 2. These object pairs were depicted under both nonbizarre and bizarre elaboration. The classification data previously collected for these pairs with second grade children indicated a 98% agreement rate with the adult classification of the pictorial elaborations as being either nonbizarre or bizarre.

The basic 12 pair list was modified to permit the within subject assessment of presentation mode. Thus, the 12 pairs were randomly divided into two equal sets of six. Each set represented one of the different presentation modes in the list. In order to provide an unequivocal assessment of the effects of presentation mode apart from the effects of item difficulty, items were counterbalanced across presentation modes, resulting in two versions of the paired-associate list. Pairs within each list were presented in a random order with the constraint that no more than two pairs from the same presentation mode could appear in sequence.

The procedures for the administration of the paired-associate task for the immediate test session were identical to those described for the first two experiments except that only one study-test cycle was used. After a seven day retention interval, subjects were required to return for another test. This consisted of one subject-paced cued recall test trial. Stimulus presentation on this test trial, identical with the immediate test, was both aural-verbal and pictorial.

Results and Discussion

The dependent variable selected for analysis on the immediate test was the total number of correct responses given on the test trial, while the dependent variable selected for analysis in long term retention was a loss score.

This score consisted of the number correct on the immediate test minus the number correct on the retention test. The Type I error rate for all tests was set equal to .025. Analysis of variance indicated that the factor of list and its interaction with presentation mode were not associated with any significant effects on either the immediate test or long term retention. Thus, the means presented in Table 3 for both phases of the experiment are collapsed

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Insert Table 3 about here

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over the factor of list.

Analysis of variance failed to detect a reliable difference between the presentation modes on the immediate test, $F(1,18) = 4.07$, $p > .05$. This finding is consistent with the previous within subjects assessment of bizarre elaboration effects. The comparison of particular interest in this third experiment is between nonbizarre and bizarre elaboration on the seven day retention test. The difference between the two presentation modes was not statistically reliable, $F(1,18) = 2.77$. Thus, forgetting of TBR pair members encoded under the two types of elaboration was equivalent.

The rate of within-list and extralist intrusions was tabulated for the retention test trial. The rate of within-list intrusions was 1.25 of an item, while the rate of extralist intrusions was .95 of an item. Separate analyses of variance were performed for each type of intrusion. In both analyses, all F ratios were less than 1.

General Discussion

The present study was conducted to assess the influence of bizarre elaboration on children's paired-associate retention. It was proposed that bizarre elaboration would induce the encoding of referential events for the TBR pair

members which would be less prone to inter-item interference, thereby providing for superior retention relative to pairs encoded under nonbizarre elaboration. The evidence from the three experiments indicates that while both nonbizarre and bizarre elaboration facilitate performance relative to standard presentation, the two types of elaboration do not consistently differ on either immediate or delayed tests of retention. This outcome suggests that the quality of the referential events encoded for the TBR pair members under the two types of elaboration should be considered equivalent.

It will be recalled that previous pictorial elaboration studies with children have typically included both bizarre and nonbizarre elaborations within the same learning list. The outcome of the present study implies that the facilitation observed in these previous studies can be attributed primarily to the conjunction of the pair members per se, as opposed to the specific type of elaboration (nonbizarre or bizarre) or some additive combination of pair member conjunction and pair relationship bizarreness.

Although the specific pictorial manipulation in this study did not influence referential event quality for the encoded pair, it would be inappropriate to conclude that other variations in pictorial elaboration will operate in the same way. For example, Rohwer, Lynch, Levin, and Suzuki (1967) report that the degree of elaboration depicted between pair members (i.e., separated vs. locational vs. sequential interaction) affects referential event quality. Research in verbal elaboration suggests that the meaningfulness of the relationship suggested for pair members (Rohwer & Levin, 1968) and the symmetry of the relationship to the stimulus and response members of the pair (Ehir & Rohwer, 1969; Hasher, Griffin, & Johnson, 1977) are factors which can also influence referential event quality. Whether these factors will have a similar effect under pictorial elaboration has yet to be determined.

The absence of a nonbizarre elaboration versus bizarre elaboration difference in the present study is consistent with findings with adults which indicate equivalent levels of paired-associate performance between nonbizarre and bizarre interactive imagery instructions (e.g., Nappe & Wollen, 1973; Hanuch, Walsh, & Kroll, 1976). It will be recalled that two studies with adults also indicated that nonbizarre and bizarre pictorial elaboration did not differ in paired-associate learning (Senter & Hoffman, 1976; Wollen et al., 1972). However, in these studies the bizarreness of the individual referents was allowed to covary with the manipulation of pictorial elaboration (nonbizarre vs. bizarre). In the present study, the results from the first experiment indicate that the nature of the individual referent depiction can influence performance under elaboration conditions with children. Specifically, the results indicated that bizarre referent characterization impaired performance relative to nonbizarre referent characterization within both of the elaboration conditions (i.e., nonbizarre and bizarre). A tentative interpretation of this finding is that the unusual depiction of the individual referents (i.e., bizarre referent characterization) may have detracted the children from completely processing or "reading" (cf., Reese, 1977) the relationship suggested for the pair members under elaboration, thereby impeding the encoding of the pair members within a cohesive referential event relative to nonbizarre referent characterization.

In summary, the present series of experiments were conducted to determine the degree to which bizarreness influences elaborative facilitation in children's paired-associate retention. The results clearly indicate that under typical paired-associated task conditions, bizarre elaboration does not reliably differ from nonbizarre elaboration. Thus, it can be concluded that it is the conjunction of TBR pair members per se, which is primarily responsible for the magnitude of facilitation usually associated with pictorial elaboration.

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Footnotes

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[1]It should be kept in mind that the *F* ratios associated with the presentation mode contrasts within each level of referent characterization are not independent because the set of comparisons is not orthogonal.

Table 1

Mean Number of Correct Responses as a Function of Referent Characterization and Presentation Mode

Referent Characterization	Presentation Mode			
	Standard	Nonbizarre Elaboration	Bizarre Elaboration	*M*
Nonbizarre	6.70	11.56	10.17	9.48
Bizarre	5.83	9.40	8.19	7.81
M	6.27	10.48	9.18	

MS_e (132) = 17.81.

Table 2

Mean Number of Correct Responses as a Function of Grade Level and Presentation Mode

Grade Level	Presentation Mode			
	Standard	Nonbizarre Elaboration	Bizarre Elaboration	M
Kindergarten	2.00	3.62	2.83	2.82
Second	2.40	3.88	3.79	3.35
M	2.20	3.75	3.31	

Table 3

Mean Acquisition and Retention Performance

As Function of Presentation Mode

Presentation Mode	Acquisition: Mean Number Correct[a]	Retention: Loss Scores[b]
Nonbizarre Elaboration	2.90	1.45
Bizarre Elaboration	3.65	1.30

[a] $\underline{MS}_e$ (18) = 2.76

[b] $\underline{MS}_e$ (18) = 2.11

Figure Caption

Figure 1. Examples of the different referent characterizations and modes of presentation for the to-be-remembered pair basket-scissors.

PRESENTATION MODE

REFERENT CHARACTERIZATION

STANDARD

NONBIZARRE ELABORATION

BIZARRE ELABORATION

NONBIZARRE

BIZARRE